

REMARKS

By the present Amendment, claims 11, 18, 20 and 23 are amended, claims 16, 17 and 19 are canceled, and claim 24 is added. This leaves claims 11-15, 18 and 21-24 pending in the application, with claim 11 being independent.

Rejection Under 35 U.S.C. §102 and §103

Claim 11, as amended, covers a pressure accumulator for dampening pulses comprising an accumulator housing 10 having a gas space 26 and a fluid space 40 therein, a piston part 28 located and movable in the housing, and a bellows-shaped separating element 30. The housing has opposite first and second inside walls 60, 64, with the second inside wall having an annular extension 36 with a cylindrical guide surface 42 inside the housing. The piston part has a stop 58 at one of its ends engageable with and adjacent to the first inside wall of the housing and has a stop surface 62 on its opposite end engageable with the second inside wall of the housing. The opposite end of the piston part is movable along its longitudinal axis within the guide surface, and maintains a radial distance and forms a radial gap between the piston part and the guide surface. The separating element is supported at one end 32 on the piston part adjacent the stop and at an opposite end 34 on the housing to separate the gas space and the fluid space in the housing with the piston part in a fluid-tight manner. The separating element extends along an outer peripheral side of the piston part from the annular extension to the one end of the piston part. A definable volumetric portion of a working gas and a liquid fill gas space 26. The liquid in the gas space is an alcohol.

By forming the pressure accumulator in this manner, the accumulator can be made small while providing effective dampening and smoothing of pulsations in the fluid medium in and

connected to fluid space 40. The liquid alcohol in the gas space reduces the volume of the gas in that space. Additionally, expansion and contraction of the fold parts are supported on and facilitated by the liquid alcohol in the gas space, increasing surface life and operating reliability of the pressure accumulator, particularly for rapid pulsations and high-speed pressure surges. This claimed structure is not disclosed or rendered obvious by any of the cited patents considered individually or in any obvious combination thereof.

Claim 11 stands rejected under 35 U.S.C. §102 as being anticipated by or under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 2,916,052 to Peters. The Peters patent is cited as disclosing an accumulator (presumably relative to Fig. 2) having a housing 1, a gas space C' and a fluid space C where the two spaces are separated by a bellows 8 and a piston 9. The separation for the two spaces is alleged to be fluid tight and gas tight or would be obvious to make them fluid tight and gas tight. The fluid space is alleged to have a working gas (vapor 11) and a liquid 10 which liquid allegedly can be an alcohol (see column 6, line 38).

Claims 12-15 and 22 stand rejected under 35 U.S.C. §103 as being unpatentable over the Peters patent in view of U.S. Patent No. 4,717,494 to Itatani. The Peters patent is relied upon for its heating element 6 as providing thermal control of the liquid and gas temperature to control proper equilibrium. The Itatani patent is cited for use of ethylene glycol as an alcohol in an accumulator system for controlling the liquid with respect to heat as it relates to a gas. In support of the rejection, it is alleged that it would be obvious to use the Itatani ethylene glycol as the alcohol for the liquid 10 in the Peters device. The use of diesel fuel or heavy oil is considered a mere intended use for which the Peters device is allegedly capable. The Peters segment 12 is considered an ante-chamber where fluid is provided and removed via the conduits 5 and 5'. The

curvature of the Peters piston 9 is alleged to provide a cavity and to be obvious to make face in the opposite direction toward the fluid space.

Claims 16, 17, 21 and 23 stand rejected under 35 U.S.C. §103 as being unpatentable over the Peters patent in view of U.S. Patent No. 4,997,009 to Niikura. The Niikura patent is cited for a pressure accumulator having a particular piston configuration that allegedly would be obvious to use in the Peters device.

Claims 18-20 stand rejected under 35 U.S.C. §103 as being unpatentable over the Peters and Itatani patents when further considered in view of Niikura. The Niikura patent is cited relative to the use of a piston part that comprises a stop that allegedly would be obvious to use in the Peters device.

Claims 12-15 and 22 stand rejected under 35 U.S.C. §103 as being unpatentable over the Peters patent in view of U.S. Patent No. 3,933,172 to Allen. The Peters patent is cited as disclosing a heating element 6 for heating liquid in the gas space for thermal control. The Allen patent is cited for an accumulator system using ethylene glycol in space 46. In support of the rejection, it is alleged that it would be obvious to use the Allen ethylene glycol as the alcohol in the Peters device. The use of diesel fuel or heavy oil is considered to be a mere intended use for which the Peters is capable. The Allen patent is also cited for the use of oils which is allegedly obvious to use with the Peters device. The Peters segment 10 is relied upon as an ante-chamber through which fluid is provided and removed via conduits 5 and 5'. The curvature of the Peters piston 9 is alleged to provide a cavity, which allegedly would be obvious to face the fluid space.

Claims 18-20 stand rejected under 35 U.S.C. §103 as being unpatentable over the Peters and Allen patents, when further considered in view of the Niikura patent. In support of the

rejection, it is alleged that it would be obvious to modify the Peters piston to provide a stop as allegedly taught by the Niikura patent.

Claims 11-23 stand rejected under 35 U.S.C. §103 as being unpatentable over Niikura patent in view of the Allen patent and U.S. Patent No. 5,031,664 to Alaze. The Niikura patent is cited for a pressure accumulator having a housing 15, a piston 35, a bellows 17, two working chambers 45 with a gas chamber and a liquid chamber sealed in a gas tight manner. The fluid connections 21 and 22 can allegedly be used for heavy oil. A channel is allegedly formed around the Niikura piston between the piston and the wall capable of holding fluid, with the piston being movably guided in the housing. A stop 55 allegedly prevents contact of the piston with the accumulator inside wall 36. The fluid connection is allegedly connected to ante-chamber inside portion 16 of the housing. In support of the rejection, it is alleged that it would be obvious to provide alcohol in the gas chamber as suggested by the Peters patent and that ethylene glycol would be an obvious alcohol.

The Peters patent appears to be cited for energy transfer system disclosed in connection with the embodiment of Fig. 2. This embodiment involves a bellows 8 with an end plate 9 located in a housing 1 to separate a compartment C from the inside of the bellows section 12 and conduits 5 and 5'. The Peters end plate 9 alleged to correspond to the claimed piston part does not have claimed configuration of the stop and stop surface engageable with the respective inside walls of the housing, the claimed configuration of the piston part opposite end and the guide surface on the housing annular extension and the claimed configuration of the separating element along the outer peripheral side of the piston part from the annular extension to the piston part one end. These deficiencies in the Peters patent are not cured by the other cited patents.

The Itatani and Allen patents are only cited for the use of ethylene glycol, and thus, do not relate to the deficiencies noted above.

The Niikura patent cited relative to the piston part configuration discloses an end plate 32 movable in a housing and a bellows 30 having fixed end 33 attached to the housing end wall 33 and having an opposite end attached to end plate 32 with a seal member 32. The Niikura end plate is not shown to be engageable with the housing bottom end (as shown in Fig. 1) and is only shown to engage face 36 of annular support seat 17. The end plate 32 forming the Niikura piston also does not move within a guide surface of a housing annular extension. The Niikura bellows 30 does not extend along an outer peripheral side of end plate 32. Thus, the Niikura patent does not teach or render obvious the noted deficiencies in the Peters patent.

Moreover, the Niikura patent does not anticipate or render obvious the subject matter of amended claim 11, considered alone or in any obvious combination with the Allen or Peters and Alaze patents, particularly relative to the deficiencies noted in the paragraph directly above.

The Allen and Alaze patents are cited in combination with the Niikura patent, but are not mentioned in the explanation of the rejection. Only the Peters patent is mentioned in the explanation relative to the use of alcohol and ethylene glycol. Thus, the Peters patent does not relate to the deficiencies in the Niikura patent, and no explanation is provided relative to the application of the Allen and Alaze patents. The Allen and Alaze patents do not teach or render obvious these noted deficiencies in the Niikura patent.

Accordingly, claim 11 is patentably distinguishable over the cited patents.

Claims 12-15, 18 and 21-24, being dependent upon claim 11, are also allowable for the above reasons. Moreover, these dependent claims recite additional features further distinguishing them over the cited patents.

Claim 12 is further distinguishable by the alcohol liquid in the gas space being ethylene glycol in combination with the claimed housing, piston part and separating element.

Claim 13 is further distinguishable by the fluid connections, in combination with the claimed housing, piston part and separating element.

Claim 14 is further distinguishable by the supply of diesel fuel or heavy oil to the fluid space, in combination with the claimed housing, piston part and separating element.

Claim 15 is further distinguishable by the piston cavity. No such cavity is in the Niikura device.

Claim 18 is further distinguishable by the stop on the piston facing the fluid connectors, particularly in combination with the claimed housing, piston part and separating element.

Claim 20 is further distinguishable by the stop surface engaging the housing second inside wall, particularly in combination with the claimed housing, piston part and separating element.

Claim 21 is further distinguishable by the metal bellows that can receive the liquid alcohol in the gas space.

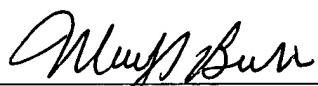
Claim 22 is further distinguishable by the common antechamber within the piping, particularly in combination with the claimed housing, piston part and separating element.

Claim 23 is further distinguishable by the annular gap that conveys the working gas and liquid flow to an inside surface of the separating element.

Claim 24 is further distinguishable by the separating element extending along the piston part cylindrical wall between the stop and the stop surface. That structure is not disclosed or rendered obvious by the Peters or Niikura patent.

In view of the foregoing, claims 11-15, 18 and 21-24 are allowable. Prompt and favorable action is solicited.

Respectfully submitted,



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Dated: September 7, 2010